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Financial and Fiscal Shocks in the Great Recession and Recovery of the Spanish Economy

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Introduction

"The recent crisis has raised, correctly, the question of how best to improve modern macroeconomic theory. I have argued we need more of it. After all, when the AIDS crisis hit, we did not turn over medical research to acupuncturists. In the wake of the oil spill in the Gulf of Mexico, should we stop using mathematical models of oil pressure? Rather than pursuing elusive chimera dreamt up in remote corners of the profession, the best way of using the power in the modeling style of modern macroeconomics is to devote more resources to it."

Chari (2010): Testimony before the Committee on Science and Technology, US House of Representatives

Introduction

- The recession that began in 2008 has had its own characteristics but many similar characteristics of other previous financial, real estate and sovereign debt crisis
- Nevertheless, the intensity, duration and combination of different shocks forces us to revise our analysis tools to evaluate the relevance of the different potential drivers behind the crisis
- Here we extend REMS model (Boscá et al, 2010) with a financial sector and the estimation of financial, fiscal, external and other macroeconomic shocks is potentially a very useful complement to the analysis tools already available
- Improve our understanding of the Spanish economy from a macroeconomic perspective

Introduction

- Estimated Rational Expectations Model of the Spanish economy v2 (EREMS2)
- EREMS2 aims the estimation, simulation and evaluation of macroeconomic policies in Spain as similar models (QUEST, IMF, ECB, Fed, ...) at the frontier
- EREMS2 complements the macroeconomic analysis of the Spanish economy: REMS (Boscá, Domenech, Ferri and Varela, 2011), BEMOD (Andrés, Burriel and Estrada, 2006) and MEDEA (Burriel, Fernandez-Villaverde and Rubio, 2007)
- It is a dynamic stochastic general equilibrium model with a system of equations very well founded at the microeconomic level
- EREMS2 is a model of an open economy intermediate size in a monetary union, which takes into account the interaction between financial and real variables at the aggregate level

Introduction

- EREMS2 expands REMS in two main directions of interest given the recent economic crisis:
  - It includes a financial sector
  - It provides an estimate of shocks that explain the dynamics of the main macroeconomic aggregates
- EREMS2 is:
  - a dynamic general equilibrium model for the simulation and evaluation of macroeconomic policies
  - a forward-looking model
  - Their structural equations adequately capture changes in economic policy regime

Introduction

- Core model
  - general equilibrium model for the eurozone with a banking system (Gerali, Neri, Sessa and Signoretti, 2010)
  - public sector extension (Domenech, Garcia, Mendez and Rubio-Ramirez, 2013)
- This core model has been extended and modified in two major directions:
  - small open economy in a monetary union
  - it is estimated using data for the Spanish economy

The model

- We consider an open economy in which the home country (Spain) is relatively small to rest of the world and belongs to a monetary union.
- The economy trades with the rest of the world consumption and investment goods as well as international nominal bonds
- Four types of households: patient, impatient, hand-to-mouth and entrepreneurs:
  - The patient (impatient) households consume, save (borrow), supply labor, and accumulate housing services.
  - The hand-to-mouth households consume, supply labor and have access neither to deposits nor to loans.
  - Households delegate their labor decisions to labor unions who operate in monopolistically competitive markets.
  - Entrepreneurs purchase capital and rent it to intermediate good producers, consume and borrow

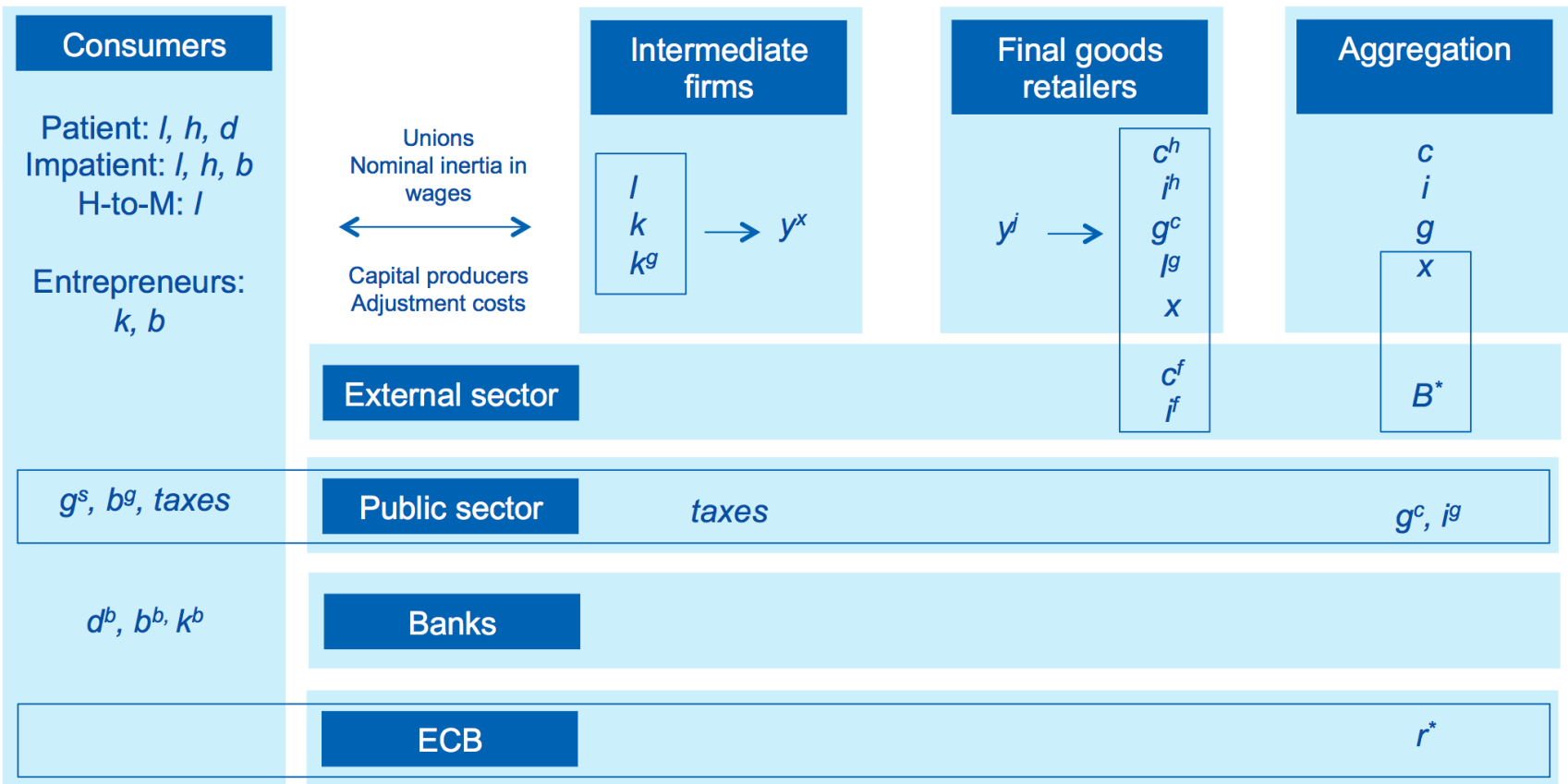
The model

- Intermediate good producers hire labor and rent capital from entrepreneurs to produce intermediate goods that are sold to good retailers
- Retailers buy intermediate goods and sell monopolistically final goods to consumers and capital producers
- Banks form holding units composed by a wholesale bank, a loan-retailing bank, and a deposit-retailing bank.
- Patient households deposit their savings on deposit-retailing banks.
- Impatient households and entrepreneurs take loans on loan-retailing banks.
- Deposit-retailing and loan-retailing banks operates in monopolistically competitive markets.

The model

- To ensure stationarity of equilibrium, banks pay a risk-premium that increases with the country's net foreign asset position
- Fiscal authority provides public consumption goods, invests, borrows, and sets lump-sum taxes and distortionary taxes on consumption, housing services, labor earnings, capital earnings, and financial operations (bond and deposit changes).
- Fiscal authority reacts by rising lump-sum taxes to deviations of the ratio of debt over GDP with respect to its objective.
- A supra-national monetary authority (ECB) sets the interest rate using a Taylor rule.

The model



Model structure

Patient households

- **Maximize utility**

$$E_0 \sum_{t=0}^{+\infty} \beta_p^t \left[(1-a_{cp}) \varepsilon_t^z log(c_{j,t}^p - a_{cp} c_{t-1}^p) + a_{hp} \varepsilon_t^h log(h_{j,t}^p) - \frac{a_{\ell p} \ell_{j,t}^{p\,1+\phi}}{1+\phi} \right],$$

subject to the following budget constraint:

$$(1+\tau_t^c) c_{j,t}^p + (1+\tau_t^h) q_t^h \Delta h_{j,t}^p + d_t^{j,p} + \tau_t^{fd} \Delta d_{j,t}^p =$$

$$(1-\tau_t^w) w_{j,t}^p \ell_{j,t}^p + \left[\frac{1+(1-\tau_t^d) r_{t-1}^d}{\pi_t} \right] d_{j,t-1}^p + \frac{J_t^R}{\gamma_p} + (1-\omega_b) \frac{J_{t-1}^b}{\gamma_p} - \frac{T_t^{up}}{\gamma_p} - \frac{T_t^g}{\gamma_p + \gamma_i + \gamma_e}.$$

Impatient households

- They have debts instead of wealth, and maximize utility

$$E_0 \sum_{t=0}^{+\infty} \beta_i^t \left[(1 - a_{ci}) \varepsilon_t^z log(c_{j,t}^i - a_{ci} c_{t-1}^i) + a_{hi} \varepsilon_t^h log(h_{j,t}^i) - \frac{a_{\ell i} \ell_{j,t}^{i\,1+\phi}}{1+\phi} \right]$$

subject to:

$$(1+\tau_t^c) c_{j,t}^i + (1+\tau_t^h) q_t^h \Delta h_{j,t}^i + \left(\frac{1+r_{t-1}^{bi}}{\pi_t} \right) b_{j,t-1}^i + \tau_t^{fb} \Delta b_{j,t}^i =$$

$$(1-\tau_t^w) w_{j,t}^i \ell_{j,t}^i + b_{j,t}^i - \frac{T_t^{ui}}{\gamma_i} - \frac{T_t^g}{\gamma_p + \gamma_i + \gamma_e}.$$

$$(1+r_t^{bi}) b_{j,t}^i \leq m_t^i E_t \left\{ q_{t+1}^h h_{j,t}^i \pi_{t+1} \right\},$$

Hand-to-mouth households

- They have neither debt nor wealth, and maximize utility

$$E_0 \sum_{t=0}^{+\infty} \beta_m^t \left[(1 - a_{cm}) \varepsilon_t^z log(c_{j,t}^m - a_{cm} c_{t-1}^m) - \frac{a_{\ell m} \ell_{j,t}^{m\,1+\phi}}{1+\phi} \right].$$

subject to

$$(1 + \tau_t^c) c_{i,t}^m = (1 - \tau_t^w) w_t^m \ell_{i,t}^m - \frac{T_t^{um}}{\gamma_m}.$$

Entrepreneurs

- Maximize the following lifetime utility function

$$E_0 \sum_{t=0}^{+\infty} \beta_e^t (1 - a_e) log(c_{j,t}^e - a_e c_{t-1}^e).$$

subject to

$$(1 + \tau_t^c) c_{j,t}^e + \left(\frac{1 + r_{t-1}^{be}}{\pi_t} \right) b_{j,t-1}^e + \tau_t^{fb} \Delta b_{j,t}^e + q_t^k k_{j,t}^e =$$

$$(1 - \tau_t^k) r_t^k k_{j,t}^e + b_{j,t}^e + q_t^k (1 - \delta) k_{j,t-1}^e + \frac{J_t^x}{\gamma_e} + \frac{J_t^k}{\gamma_e} - \frac{T_t^g}{\gamma_p + \gamma_i + \gamma_p}.$$

$$(1 + r_t^{be}) b_{j,t}^e \leq m_t^e E_t \left\{ q_{t+1}^k \pi_{t+1} (1 - \delta) k_{j,t}^e \right\},$$

Unions

- Unions maximize the households' utility perceived from the wage income, net of a quadratic cost for adjusting the nominal wage and the labour supply desutility:

$$E_0 \sum_{t=0}^{+\infty} \beta_s^t \left\{ U_{c,j,t}^s \theta_t^{wc} \left[w_{j,t}^s \ell_{j,t}^s - \frac{\eta_w}{2} \left(\pi_{j,t}^{ws} \theta_t^w - \pi_{t-1}^{\iota_w} \pi^{1-\iota_w} \theta_{t-1}^c \right)^2 w_t^s \right] - \frac{a_{\ell^s} {\ell^s}_{j,t}^{1+\phi}}{1+\phi} \right\}$$

subject to

$$\ell_{j,t}^s = \left(\frac{w_{j,t}^s}{w_t^s} \right)^{-\varepsilon_t^\ell} \ell_t^s$$

Intermediate good producers

- **Production function**

$$y^x_{j,t} = A_t \left(k^{ee}_{j,t-1} u_{j,t} \right)^{\alpha} \left[\left(\ell^{pp}_{j,t} \right)^{\mu_p} \left(\ell^{ii}_{j,t} \right)^{\mu_i} \left(\ell^{mm}_{j,t} \right)^{\mu_m} \right]^{1-\alpha} \left(\frac{K^g_{t-1}}{\gamma_x} \right)^{\alpha_g},$$

  where A_t denotes an aggregate TFP productivity shock.

Capital producers

- Each capital producer chooses $k_{j,t}$ and $i_{j,t}$ to maximize:

$$E_0 \sum_{t=0}^{+\infty} \beta_e^t \lambda_t^e \left\{ q_t^k [k_{j,t} - (1-\delta) k_{j,t-1}] - p_t^I i_{j,t} - \Phi_k \right\}$$

subject to quadratic adjustment costs in investment (as Bernanke, Gertler and Gilchrist, 1999).

Home goods retailers

- They operate in a monopolistically competitive market and maximize:

$$E_0 \sum_{t=0}^{+\infty} \beta_p^t \lambda_t^p P_t^H \left[\frac{P_{j,t}^H y_{j,t}}{P_t^H} - \frac{y_{j,t}^{xx}}{x_t} - \frac{\eta_p}{2} \left(\frac{P_{j,t}^H}{P_{j,t-1}^H} - \left(\pi_{t-1}^H\right)^{\iota_p} \left(\pi_{ss}^H\right)^{1-\iota_p} \right)^2 Y_t \right]$$

subject to

$$y_{j,t} = y_{j,t}^{xx}$$

$$y_{j,t} = \left(\frac{P_{j,t}^H}{P_t^H} \right)^{-\varepsilon_t^y} Y_t$$

Banks

- The two retail branches are assumed to operate in monopolistically competitive markets.
- Each unit of deposits and loan bought by households and entrepreneurs are a CES basket of slightly differentiated products supplied by each retail branch j.
- The wholesale unit manages the capital position of the group, receives loans form abroad, and raises wholesale domestic loans and deposits in the interbank market.

Whosale banks

- They choose the amount of wholesale loans, $b^b_{j,t}$ and wholesale deposits, $d^b_{j,t}$, to maximize

$$\max_{b^b_{j,t}, d^b_{j,t}, B^*_t} r^b_t b^b_{j,t} - r_t d^b_{j,t} + r^*_t \frac{B^*_t}{\gamma_b} - \frac{\eta_b}{2}\left(\frac{k^b_{j,t}}{b^b_{j,t}} - \nu_b\right)^2 k^b_{j,t}$$

where

$$\hat{k}^b_{j,t} = \frac{(1-\delta_b)}{\varepsilon^{kb}_t}\hat{k}^b_{j,t-1} + \omega_b \hat{j}^b_{j,t-1},$$

Deposit-retailing branch

- It chooses the path of the nominal gross interest rate paid by deposits, $r^d_{j,t}$, to maximize:

$$E_0 \sum_{t=0}^{+\infty} \beta_p^t \lambda_t^p \left[r_t d^b_{j,t} - r^d_{j,t} d^{pp}_{j,t} - \frac{\eta_p}{2} \left(\frac{r^d_{j,t}}{r^d_{j,t-1}} - 1 \right)^2 r^d_t d^{pp}_t \right]$$

subject to

$$d^b_{j,t} = d^{pp}_{j,t}$$

$$d^{pp}_{j,t} = \left(\frac{r^d_{j,t}}{r^d_t} \right)^{-\varepsilon^d_t} d^{pp}_t,$$

where $\varepsilon^d_t \equiv \left(\frac{\theta^d_t}{\theta^d_t - 1} \right)$

Loan-retailing branch

- The branch maximize:

$$E_0 \sum_{t=0}^{+\infty} \beta_p^t \lambda_t^p \left[\begin{array}{c} r_{j,t}^{bi} b_{j,t}^{ii} + r_{j,t}^{be} b_{j,t}^{ee} + \theta_{ss}^g r_t^b \left(\frac{B_t^g}{\gamma_b} \right) - r_t^b b_{j,t}^b - \frac{\eta_i}{2} \left(\frac{r_{j,t}^{bi}}{r_{j,t-1}^{bi}} - 1 \right)^2 r_t^{bi} b_t^{ii} \\ - \frac{\eta_e}{2} \left(\frac{r_{j,t}^{be}}{r_{j,t-1}^{be}} - 1 \right)^2 r_t^{be} b_t^{ee} \end{array} \right]$$

subject to

$$b_{j,t}^b = b_{j,t}^{ii} + b_{j,t}^{ee} + \frac{B_t^g}{\gamma_b},$$

$$b_{j,t}^{ii} = \left(\frac{r_{j,t}^{bi}}{r_t^{bi}} \right)^{-\varepsilon_t^{bi}} b_t^{ii},$$

$$b_{j,t}^{ee} = \left(\frac{r_{j,t}^{be}}{r_t^{be}} \right)^{-\varepsilon_t^{be}} b_t^{ee}.$$

where $\varepsilon_t^{bs} \equiv \left(\frac{\theta_t^{bs}}{\theta_t^{bs}-1} \right)$

External sector

- **Imports:**

$$c_t^h = (1-\omega_c)\left(p_t^H\right)^{-\sigma_c} c_t^c$$

$$c_t^f = \omega_c\left(p_t^M\right)^{-\sigma_c} c_t^c$$

$$i_t^h = (1-\omega_i)\left(\frac{p_t^H}{p_t^I}\right)^{-\sigma_i} i_t^z$$

$$i_t^f = \omega_i\left(\frac{p_t^M}{p_t^I}\right)^{-\sigma_i} i_t^z$$

External sector

- Exports demand

$$ex_t = \omega_c^* \left((1 - \tau_t^x) \left(\frac{p_t^H}{er_t} \right)^{(1-ptm)} \right)^{-\sigma_c^*} (c_t^* + i_t^*)$$

With full pricing to market ($ptm = 0$), $p_t^{EX} = (1 - \tau_t^x) p_t^H$ then

$$ex_t = \omega_c^* \left((1 - \tau_t^x) \left(\frac{p_t^H}{er_t} \right) \right)^{-\sigma_c^*} (c_t^* + i_t^*)$$

If the law of one price holds then $ptm = 1$, $p_t^{EX} = (1 - \tau_t^x) er_t$ and

$$ex_t = \omega_c^* (1 - \tau_t^x)^{-\sigma_c^*} (c_t^* + i_t^*)$$

External sector

- Net foreing asset position B_t^*

$$B_t^* = \frac{\left(1 + r_{t-1}^*\right)}{\pi_t} B_{t-1}^* + \left[p_t^{EX} \gamma^* ex_t - p_t^M \left(\gamma_c c_t^f + \gamma_z i_t^f \right) \right]$$

- Trade balance TB_t is defined as

$$TB_t = p_t^{EX} \gamma^* ex_t - p_t^M \left(\gamma_c c_t^f + \gamma_z i_t^f \right)$$

Monetary policy

- Taylor rule for the BCE

$$(1+r_t^*) = (1+r_{ss}^*)^{(1-\phi_r)}(1+r_{t-1}^*)^{\phi_r}\left(\frac{\pi_t^{emu}}{\pi_{ss}^{emu}}\right)^{\phi_\pi(1-\phi_r)}\left(\frac{y_t^{emu}}{y_{t-1}^{emu}}\right)^{\phi_y(1-\phi_r)}(1+e_t^r)$$

- Domestic interest rate

$$r_t = \phi_r r_t^*$$

where

$$\phi_t = \exp\left(-\widetilde{\phi}\left(\frac{B_t^*}{Y_t} - b^*\right)\theta_t^{rp}\right)$$

Fiscal policy rules

- Budget constraint

$$
\begin{aligned}
& C_t^g + I_t^g + \left(\frac{1+\theta_{ss}^b r_{t-1}^b}{\pi_t}\right) B_{t-1}^g = B_t^g + T_t^g + \tau_t^c \left[\gamma_p c_t^p + \gamma_i c_t^i + \gamma_e c_t^e + \gamma_m c_t^m\right] \\
+ \quad & \frac{\tau_t^m}{1+\tau_t^m} p_t^M IM_t - \frac{\tau_t^x}{1-\tau_t^x} p_t^{EX} EX_t \\
+ \quad & \tau_t^h q_t^h \left[\gamma_p \Delta h_t^p + \gamma_i \Delta h_t^i\right] + \tau_t^w \left[w_t^p \gamma_p \ell_t^p + w_t^i \gamma_i \ell_t^i + w_t^m \gamma_m \ell_t^m\right] + \tau_t^k r_t^k K_t \\
+ \quad & \tau_t^{fb} \left[\gamma_i \Delta b_t^i + \gamma_e \Delta b_t^e\right] + \tau_t^{fd} \gamma_p \Delta d_t^p + \tau_t^d \left(\frac{r_{t-1}^d}{\pi_t}\right) \gamma_p d_{t-1}^p.
\end{aligned}
$$

- Tax rates $\tau_t^s = \tau_s$ for $s = c, h, w, d, fd, fb, r, m, x$, and shocks in c^g and i^g
- Fiscal rule in lump-sum transfers

$$
\frac{T_t^g}{\gamma y_{ss}} = \frac{T_{t-1}^g}{\gamma y_{ss}} + \rho_{tgb1}\left(\frac{B_t^g}{\gamma y_t} - \frac{B^{*g}}{\gamma y_t}\right) + \rho_{tgb2}\left(\frac{B_t^g}{\gamma y_t} - \frac{B_{t-1}^g}{\gamma y_t}\right)
$$

- Public capital

$$
K_t^g = (1-\delta_g) K_{t-1}^g + I_t^g.
$$

Calibration

- General strategy: Gerali et.al's calibration values and conventions adapted to the Spanish economy
- We update the values of the interest rates spreads: averages for the sub-sample, 1997Q1-2006Q4 to avoid the influence of the crisis
- Consumer shares $\gamma_p = 0.35, \gamma_i = 0.20, \gamma_m = 0.17, \gamma_e = 0.28$.
- Share of private physical capital in the production function: 0.43 (closer to Ratto et.al., 2008, than to Gerali et.al, 2010)
- Output elasticity of public physical capital and its depreciation rate taken from Boscá et al, 2010
- The tax rates on financial transactions (τ_{fb}, τ_{fd}) and on deposits' interest yield (τ_d) are fixed in zero
- Rest of taxes corresponds to the average effective rates following Mendoza et al (1994) and using information of “Taxation trends in the European Union".
- External sector parameters: estimated outside the model.
- Other parameters taken from Boscá et al, 2010.

Calibration

Steady state ratios

	Data	Model
$\frac{C}{GDP}$	0.58	0.58
$\frac{I}{GDP}$	0.23	0.20
$\frac{C^g}{GDP}$	0.18	0.18
$\frac{I^g}{GDP}$	0.03	0.04
$\frac{c^h}{GDP}$	0.41	0.42
$\frac{c^f}{GDP}$	0.21	0.16
$\frac{i^h}{GDP}$	0.12	0.10
$\frac{i^f}{GDP}$	0.09	0.11
$\frac{EX}{GDP}$	0.25	0.27
$\frac{IM}{GDP}$	0.27	0.27

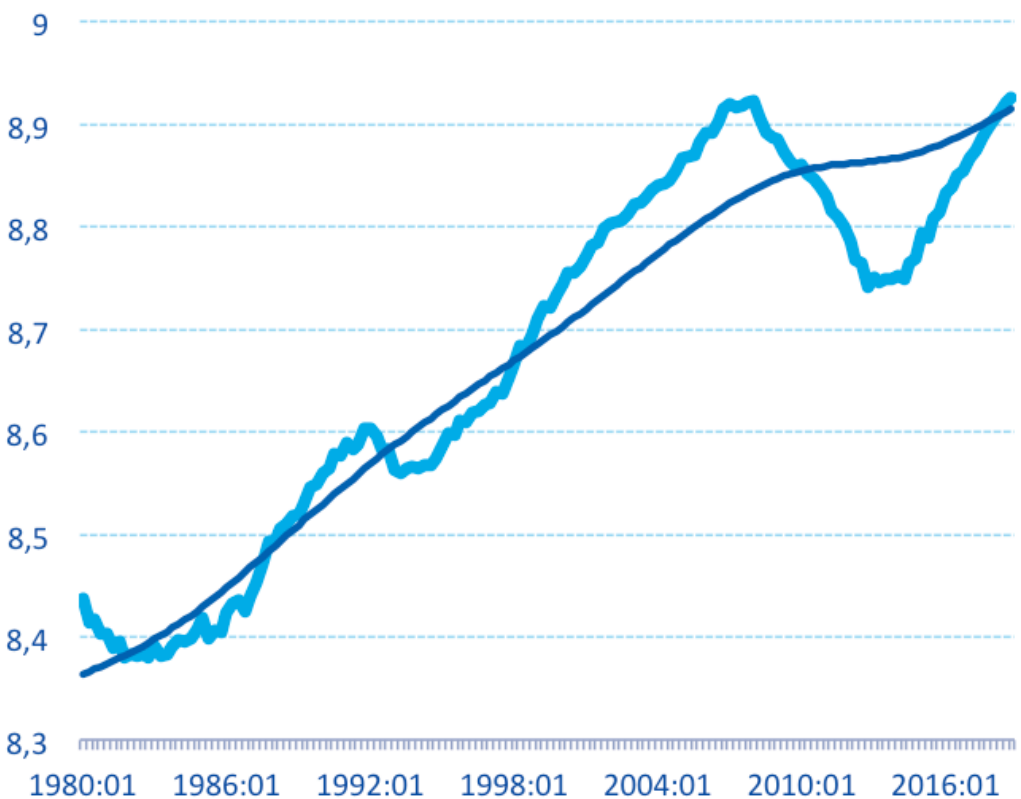
Estimation

- Preliminary results for the sample period 4Q1992 to 4Q2015.
- The parameters of the autoregressive processes for the 19 shocks and their standard errors in the model have been estimated using Bayesian estimation methods designed for stochastic general equilibrium models at the frontier.
- The dynamics of the variables and their long-term steady states are well approximated by the model
- The model allows us to analyze many aspects of the Spanish economy as the dynamics of total factor productivity, hours worked, inflation, real wages, financial and fiscal variables, etc.

Shocks and observables

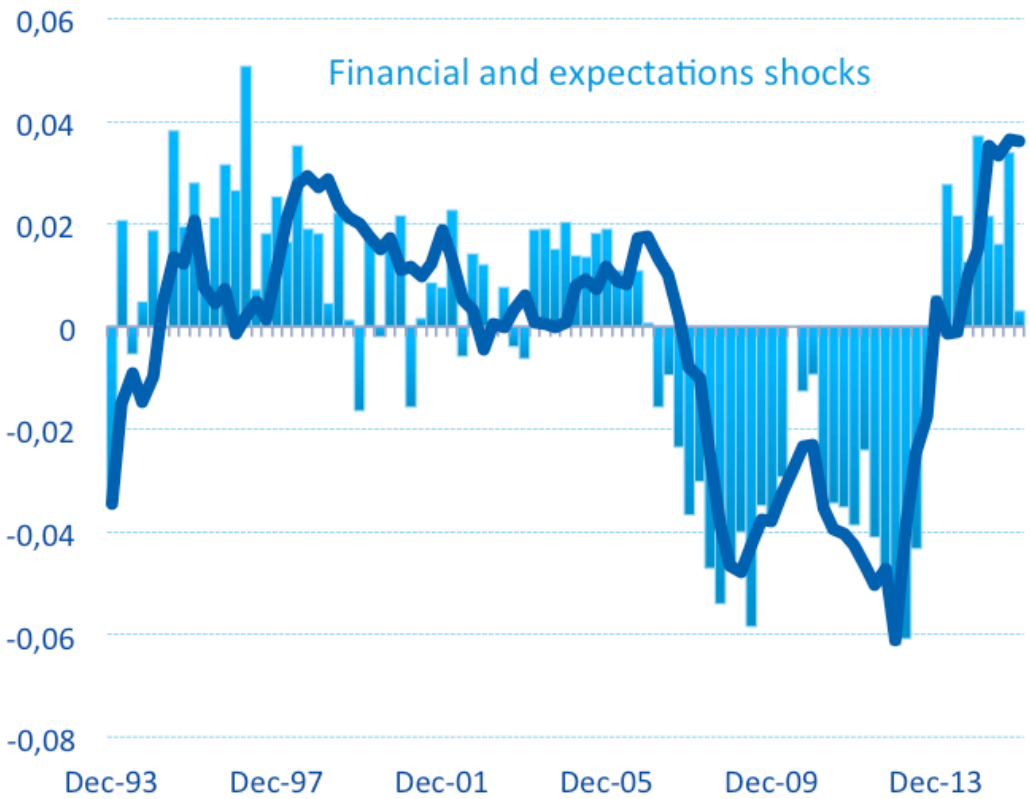
Shocks		Observables	
eA	TFP shock	C	Private consumptiom
eh	Housing preferences	Cg	Public consumption
el	Labour shock	Ig	Public Investment
eme	LTV firms	If	Private Investment
emi	LTV households	D	Deposits
ethetab	Banks' markup loans firms	bi	Loans households
ethetabi	Banks' markup loans households	be	Loans firms
ethetabd	Banks' markup deposits	r	Policy interest rate
er	Monetary policy	rd	Interest rates for deposits
ek	Investment shock	rbe	Interest rates for firms loans
ey	Markup retailers	rbi	Interest rates for households loans
ez	Consumption preferences	pi	Inflation (private consumption)
ewc	Imports	piw	Inflation (wages)
ewfc	Exports	qh	Housing price index (relative to private consumption deflator)
ep	Risk premium	IM	Imports
ecg	Public consumption shock	EX	Exports
eig	Public investment shock	Premium	Risk premium
eur	Okun's equation for UR	UR	Unemployment rate
eb	Banks' capital ratio/efficiency		

Observables: cycle decomposition



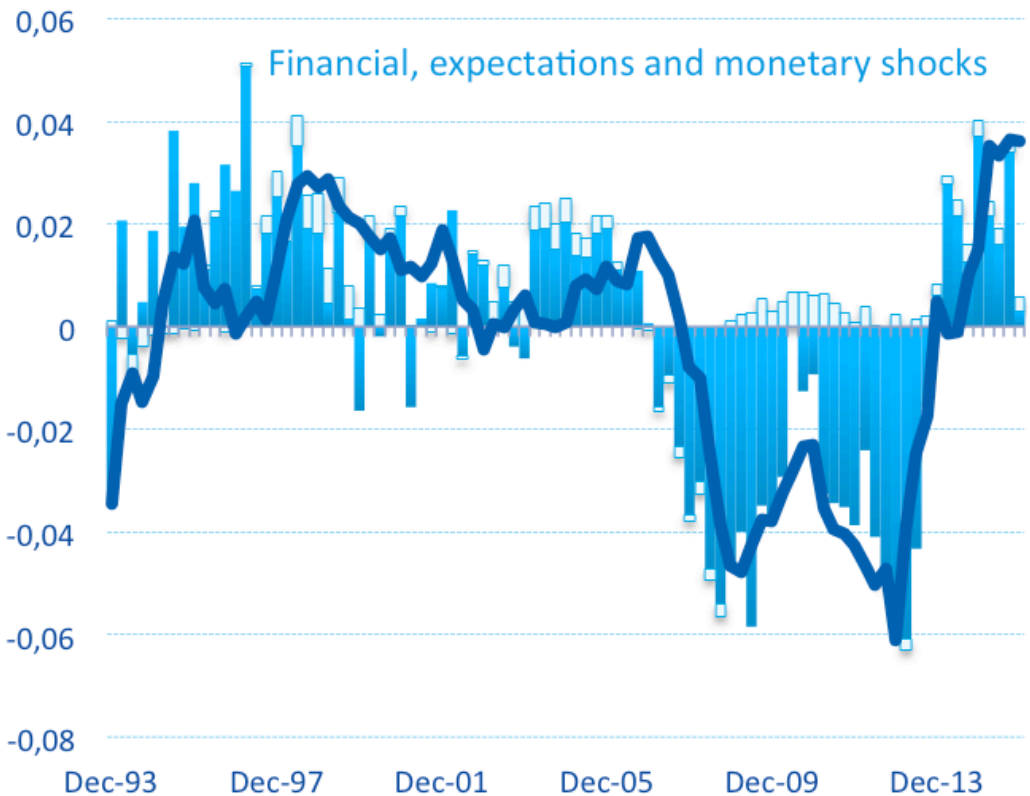
GDP per working age population and its trend. Spain, 1980:1-2018-4

Historical decomposition: financial and expectations shocks



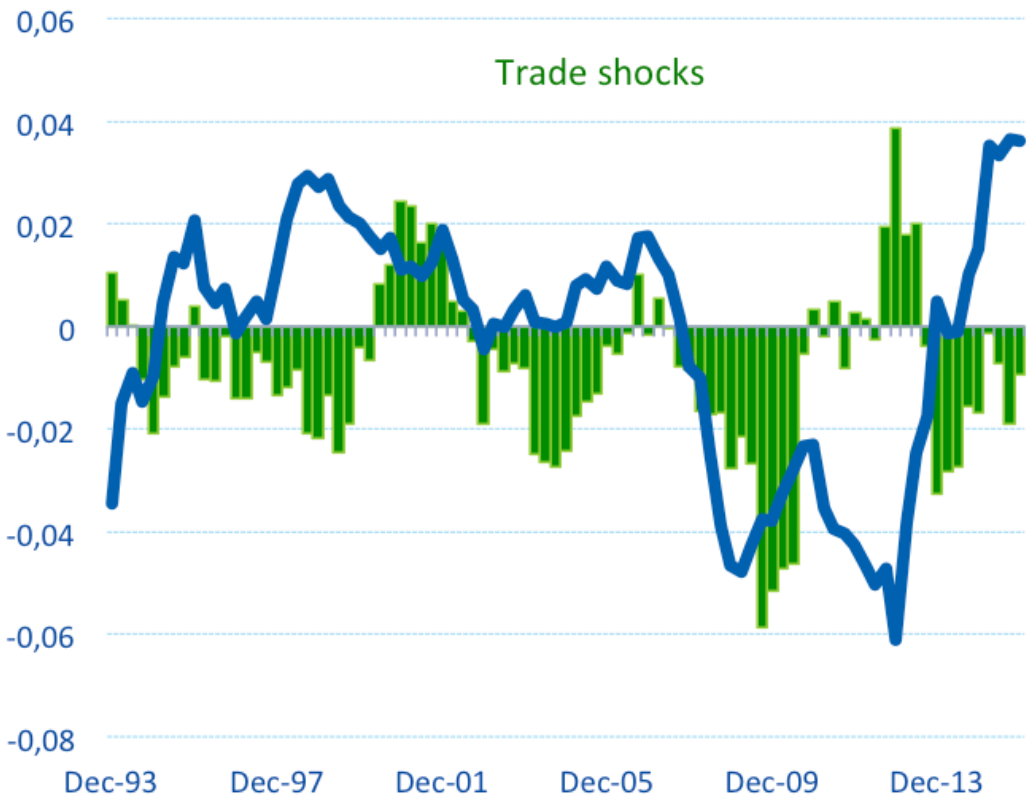
GDP growth and financial and expectations shocks, 4Q1993-4T2015

Historical decomposition: monetary shocks



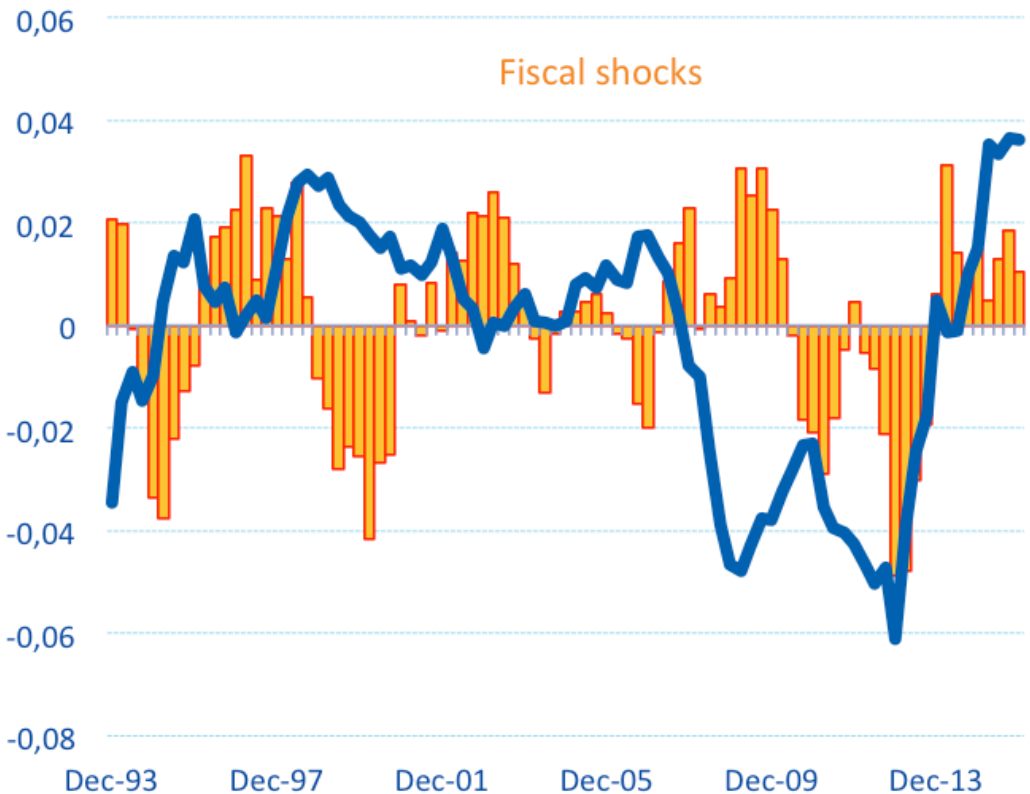
GDP growth and financial, expectations and monetary shocks, 4Q1993-4T2015

Historical decomposition: international trade



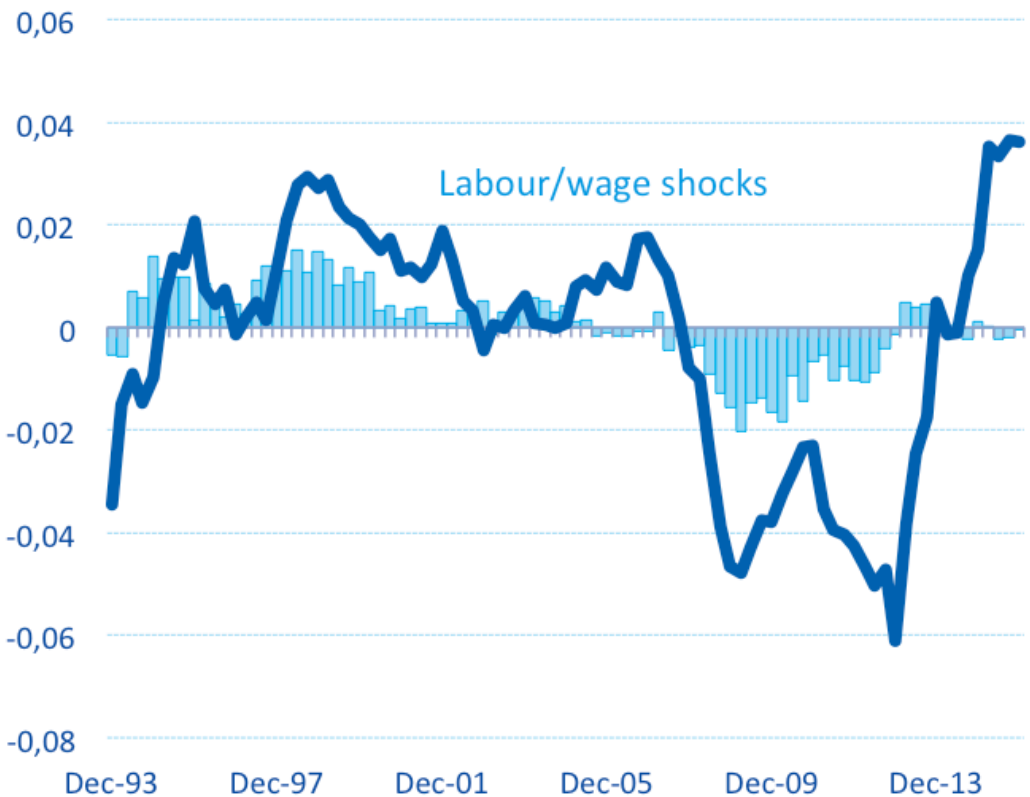
GDP growth and trade shocks, 4Q1993-4T2015

Historical decomposition: fiscal shocks



GDP growth and fiscal shocks, 4Q1993-4T2015

Historical decomposition: labour/wage shocks



GDP growth and labour/wage shocks, 4Q1993-4T2015

Historical decomposition: interpretation

- Favorable financial conditions from 2003 to 2007 explains partially GDP growth and excessive debt: intertemporal substitution of growth
- First recession: since 2008 we observe a financial and trade crisis, partly offset by an expansionary fiscal policy. Again, the expansionary demand policy increased activity then at the cost of future lover growth. The negative wage shock made the recession worse
- Second recession (sovereign debt crisis): higher financial tensions and an unavoidable fiscal adjustment due to the unsustainability of public accounts
- Recovery: gradual improvement with a positive contribution of financial, fiscal and wage shocks, despite unfavorable external trade conditions

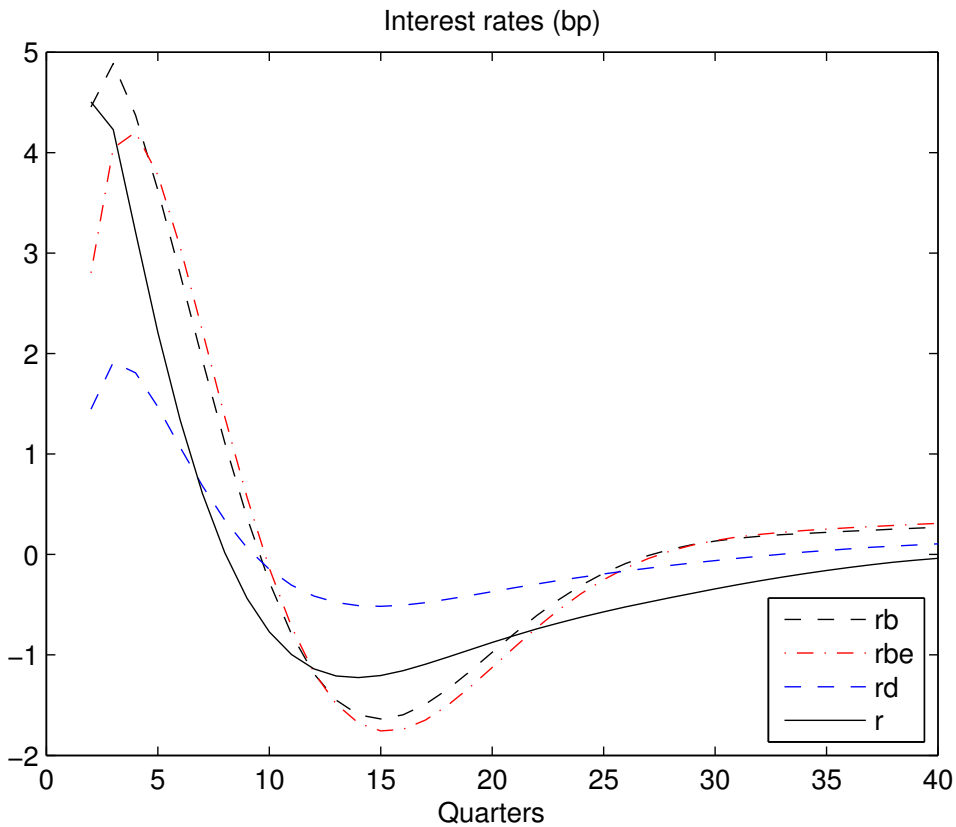
Historical decomposition: interpretation

- There are no free lunches: expansionary demand policies increase activity at the expense of lower future growth when they are reversed
- It is not possible to sustain permanently an intergenerational Ponzi scheme
- The cost of the expansionary policies in the past can be offset by effective structural measures at the present but not by new demand policies when there is no more room for indebtedness
- Risk premium and expectations can also respond to other factors in the real world that would be captured by shocks into the model

Examples of simulations

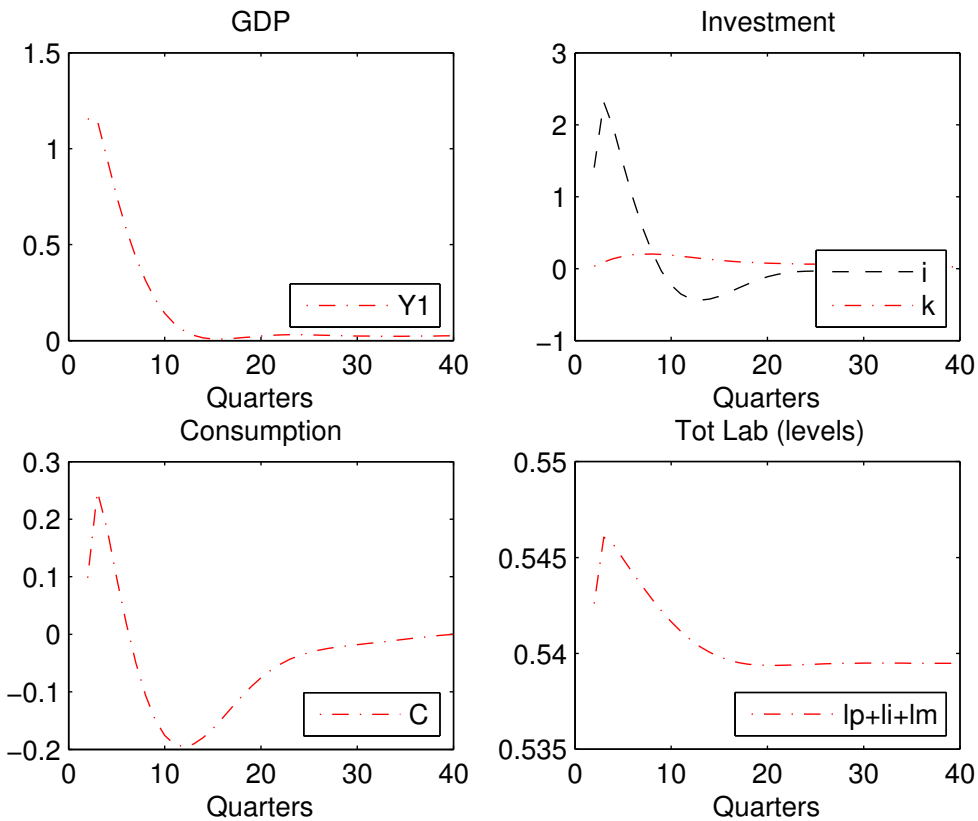
- The model also allows us to simulate the effects over time on the main economic variables of permanent and transitory changes in exogenous variables, such as:
  - Risk premium.
  - Labour markets: wage inertia and labor market competition.
  - Government spending.
  - Public investment.
  - Taxes, to analyze tax reforms as, for example, fiscal devaluations (Boscá et al., 2013), 2012 and 2014 reforms, etc.
  - Productivity enhancing structural reforms.

A 1% GDP transitory increase in government spending



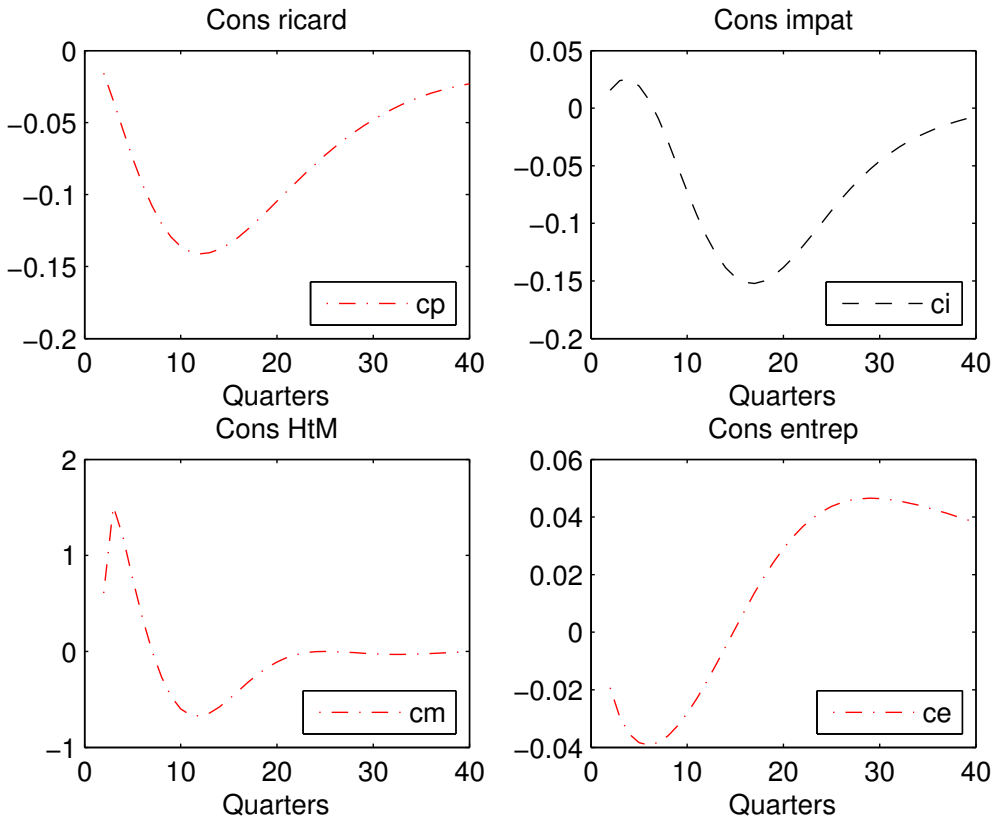
Effects on interest rates

A 1% GDP transitory increase in government spending



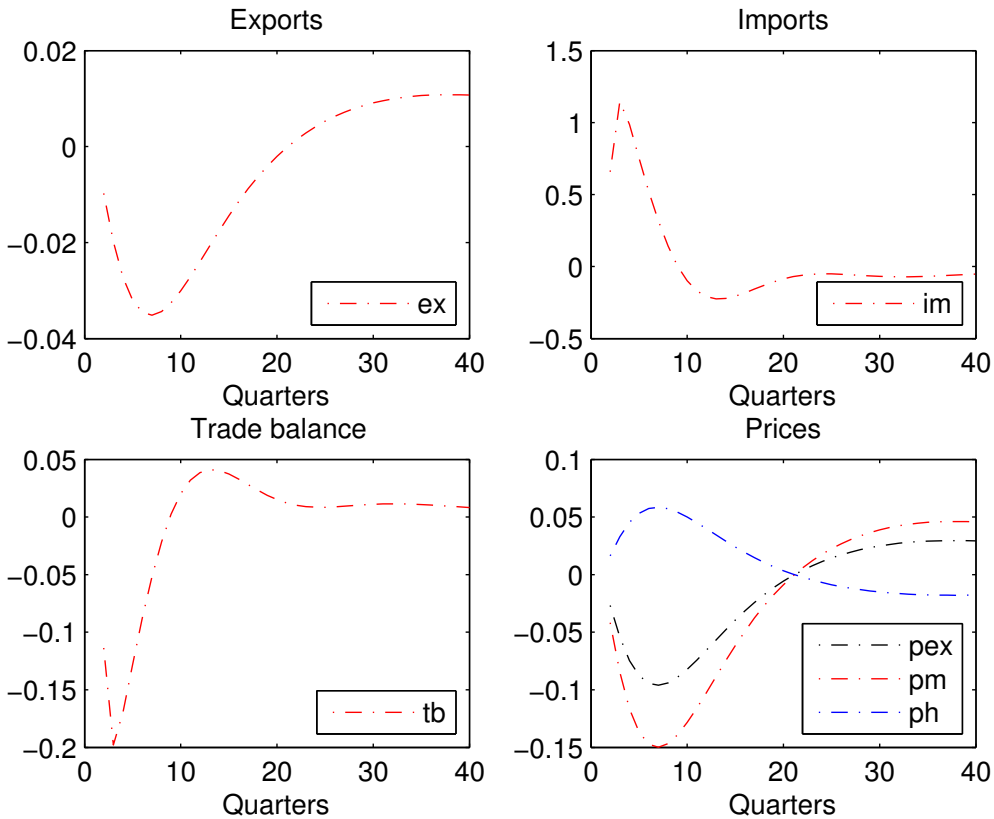
Effects on GDP, C, I and employment

A 1% GDP transitory increase in government spending



Effects on different consumers

A 1% GDP transitory increase in government spending



Effects on X, M, trade balance and inflation

A 1% GDP transitory increase in government spending

- The increase in government spending creates a negative wealth effect that affects non financial-restricted consumers permanent income.
- Some financial-restricted categories of households (hand-to-mouth, impatient households) increase consumption, but it is not enough to avoid a medium term decrease in aggregate consumption.
- Households respond reducing leisure and increasing labor supply.
- The increase in labor generates an improvement in the marginal productivity of capital which affects positively investment.
- Entrepreneurs use the credit channel to front-load investment.
- The rise in absorption capacity affects imports positively whereas exports are negatively affected by the increase in the terms of trade.
- Overall, the model simulates an impact fiscal multiplier on GDP slightly above one (Reminder: risk premium assumed to be affected only by external debt).

Conclusions and extensions

- EREMS2 is an useful model to understand the effects of financial, fiscal, international trade, labour market and other shocks in the great recession and recovery of the Spanish economy.
- It will also contribute to a better understanding of real time shocks affecting the economy.
- The model also allows us to simulate the effects of permanent and transitory changes in exogenous variables $\Rightarrow$ ex-ante evaluation of macroeconomic policies.
- Extensions: new variables, endogenous growth and forecasting.